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West Europe Report

SCIENCE AND TECHNOLOGY

No. 42

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ENERGY

HALF-SCALE WAVE-POWER PLANT OPERATIONAL

Stockholm NY TEKNIK in Swedish 2 Oct 80 pp 8-9

[Report by Hans Werner: "The Country's First Sizable Buoy Power Plant"]

> [Text] A half-scale wave-power plant has now been set out about 300 meters north-northeast of the Trubadur, [an island] off Göteborg. The top power is near 20 kW. The installation, with its measuring instruments and light, is designed for tests and supplies all of its power requirements. The surplus is burned away in submerged heaters in the sea.

After preliminary studies with smaller buoys in Lake Lygner, on the boundary between Halland and Vestergötland, the interested parties have proceeded to start the country's first larger buoy power plant. Their aim is to build plants later with at least twice the capacity per buoy.

The test is backed by the firms of Inter Project Service AB in Flen and Technocean in Göteborg, and by the wave-power research group at the Chalmers Technical Institute. Money for this development work comes from the Technical Development Board, 400,000 kronor, the Commission on Energy Production Research, 100,000 kronor, and Inter Project, the remaining 50,000 to 60,000 kronor.

Wait for Calm Weather

The buoy was put in place after a good week's wait for calm weather around [the island of] Vinga. The buoy itself is 3 m in diameter and about 3 m high. Four 2-meter legs extend downward from the buoy, and from them a 25-meter pipe with a diameter of 1 meter. In the pipe is a piston about halfway down. The piston rod transmits power through a rack and pinion to a gearbox. From it a generator in the buoy is driven. The whole weighs 6.5 tons.

Dimensioned for Summer Waves

"It is dimensioned for summer waves," says Anders Rylander, a civil engineer at Technocean in Göteborg. "That means a wave period of 3 seconds and waves barely a meter high."

Among the questions the test is expected to answer is what the mean power yield is. The experimental results will be interpreted during the winter.

Almost Full-Sized Buoy

If it is possible to go from this half-scale installation to full scale, it will not mean gigantic buoys. For the capacity increases by an exponent of 3.5 for the linear dimension and 3 for volume. The purely physical dimensions of the test buoy off the Trubadur are thus quite close to those that a full-fledged wave-power plant will have. In such a plant, however, there will be many buoys, and this involves a certain interference.

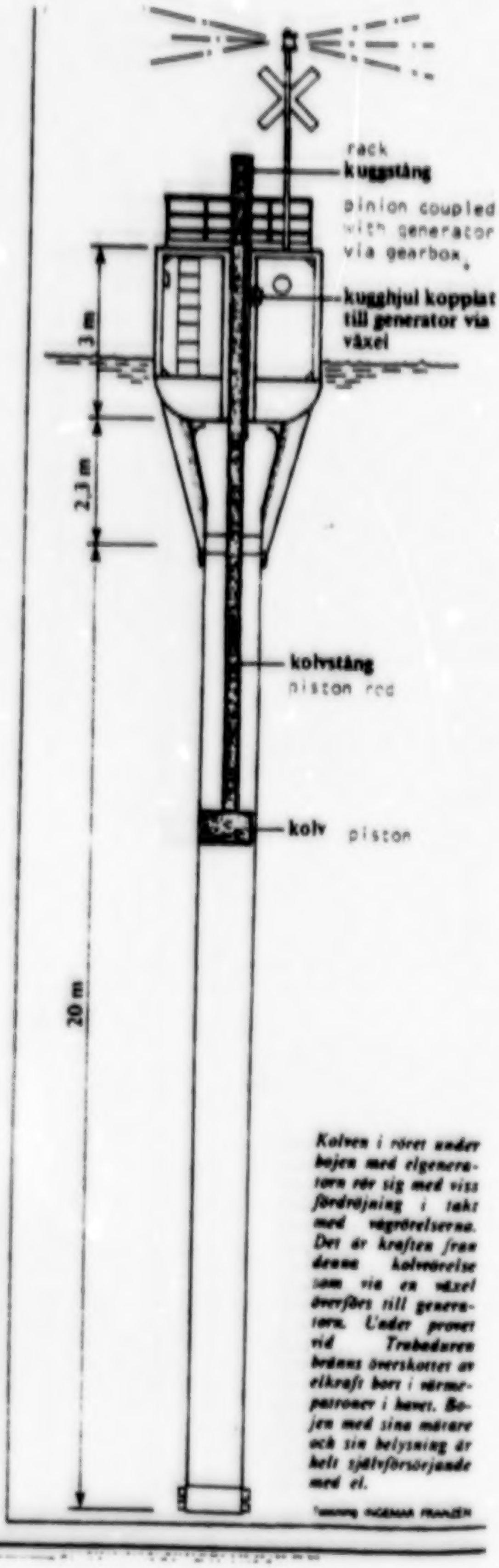
Successful Swedish Technology

Thus far the experiments with Swedish wave-power technology have been successful. The interaction among many buoys and other problems involved are being studied elsewhere. The experiment in the waters off Vinga have the prerequisites for becoming the starting point for a new Swedish energy technology.

[Figure Caption]

The piston in the pipe beneath the buoy moves with a certain lag in time with the motions of the waves. It is the power from this piston movement that is transmitted via a gearbox to the generator. During the test at the Trubadur the surplus electrical power is burned away in heat cartridges in the sea. The buoy with its measuring instruments and its lighting is completely self-supplying with electricity.

[See figure on following page]


rack
kuggstång
pinion coupled with generator via gearbox
kugghjul kopplat till generator via växel
3 m
2,3 m
20 m
kolvstång
piston rod
kolv
piston

Kolven i röret under bojen med elgeneratorn rör sig med viss fördröjning i takt med vågrörelserna. Det är kraften från denna kolvrörelse som via en växel överförs till generatorn. Under provet vid Trubaduren brännes överskottet av elkraft bort i värmepatroner i havet. Bojen med sina mätare och sin belysning är helt självförsörjande med el.

TECKNING INGEMAR FRANZÉN

8815
CSO: 3102

TWO LARGE WAVE-POWER PROJECTS UNDERWAY

Stockholm NY TEKNIK in Swedish 16 Oct 80 p 72

[Article by Lasse Sandstrom: "Two Large Norwegian Wave Projects"]

> [Text] The Norwegians are working on two large projects to create energy from waves. The most spectacular is a method of concentrating waves and forcing water up to a reservoir. The water can then be passed down through a turbine.

Oslo.

Just north of Oslo there is a wave power project which is being followed with great interest. It is at Hakkadals basin, where they are trying to focus water by means of a "wave lens."

The Central Institute for Industrial Research (SI) is conducting the work. The method involves using a long stretch of coast, several kilometers, and concentrating the waves to a center of at most 500 meters. In the middle of the center there is a funnel where the water is pressed in. The funnel leads to a water reservoir which is perhaps 100 meters over sea level. From the reservoir the water later goes down to a water turbine on a lower level, following the same principle as with hydroelectric power.

"Calculations from experiments show that 70 to 80 percent of the energy in waves would be available as potential energy in the reservoir," said Dr Even Mehlum of SI. "We focus water waves in the same way that a lens focuses light waves."

Spherical Wave

A glass lens has the ability to bend light because of its form. In the middle where the lens is thickest it takes the longest time for the light waves to pass through. On the edges where the lens is thinner the light goes relatively faster. That makes the rays which go through the edges bend in toward the center.

The main property of a lens is therefore to delay some rays compared with others so that the waves become spherical instead of straight.

That property can be translated to water waves. It is well known that wave length and speed increase with the depth of the water. So structures are built consisting of horizontal plates which are placed under water. Preliminary tests show that the depth should be about 30 meters.

Different Tests

In Hakkadal different forms and combinations of plates are being tested. The object is to devise structures which "steal" as little energy as possible, and which function in all kinds of waves (from storms to flat calms) while concentrating the waves as effectively as possible. They are also trying to devise plates which can take obstacles into consideration such as islands.

All this happens in a 100 x 150 meter basin. Up to now all theoretical calculations have been confirmed by practical experiments. Yes, it has gone so well that next year they intend to test the idea off the Norwegian coast.

"If the research program is fruitful and if we continue to get government support we expect to install a prototype power station of 50 to 150 megawatts by the end of the 1980's," said Dr Mehlum.

Trondheim

In Trondheim they have worked with buoys since 1973. That is, with conical aluminum objects which are placed out in the water. "One thousand buoys at sea correspond approximately to the power of one normal Norwegian power plant," said Johannes Falnes at the Institute for Experimental Physics in Trondheim.

The research work is still in the experimental stage. Test buoys with a diameter of about one meter are tested in basins in Trondheim. But next year it is hoped that a full scale buoy several times larger can be placed out off the coast.

Each buoy takes the energy found in the up-and-down movement of the waves. It functions so that the buoy is anchored to the bottom of the sea with a hawser. At the top of the hawser near the surface there is a piston rod with a piston above it. This part is fixed.

Movable Cylinder

The cylinder fits around the piston. It is movable and follows the movements of the waves up and down. It is therefore a closed hydraulic system which partly guides the movements of the buoy up and down, and partly transforms the energy via a turbine wheel into electricity. Special valves control the oil or the gas which is used in the system.

That is how it functioned in the beginning. But now the Norwegians have departed from high pressure hydraulics. They will not divulge what they are using instead.

However, the buoy would not give so much energy if it lay and bobbed up and down by itself on the waves. Therefore the researchers have mounted a control mechanism which uses the entire wave movement as much as possible. It is a little computer which regulates magnets and valves.

"Of course waves are not sinusoidal," explains Kjell Budal. "With help of the computer we can hold the buoy in its normal position, let it go up on a crest, remain there, and then let it go down in a trough. In this way we can get up to five times as much energy."

A buoy can give 114 kilowatts. The researchers calculate that in one year a buoy can produce about one billion watt-hours.

It is expected that each buoy will be placed in a special arrangement with five parallel rows. The distance between buoys in a row would be 80 meters.

Costs as of now are relatively high. Norwegian firms have estimated what it would cost to build one buoy. It seems that the costs of installation today are 50 to 100 percent higher than for hydroelectric power. That means a price for electricity of about 20 ore per kilowatt-hour, operating and maintenance costs not included.

It is therefore relatively expensive.

"With the version we are considering here we can not compete with hydroelectric power," said Johannes Falnes. "But we believe that we will develop significantly cheaper machinery. We are encouraged that the difference is not greater."

And there is a large reserve of energy to extract from Norway's 2,500 kilometer coastline. The entire coastline corresponds to an amount of energy equal to 500 trillion watt-hours.

"The buoys must be placed in areas which are not heavily fished, in order to avoid the risk of collision. Otherwise there is no direct environmental problem with the plan. The system creates no emissions," said Johannes Falnes.

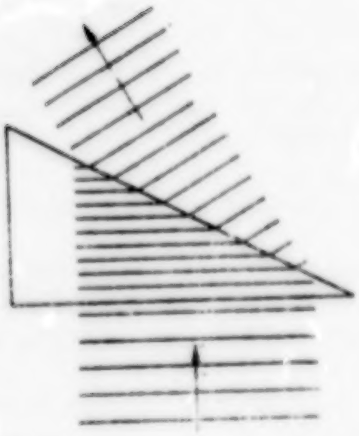
Reasonable Cost

Researchers in Trondheim will be faced with two important problems in the near future. The first is to develop buoys with reasonable construction costs. The system can not be more expensive than hydroelectric power. The other is to have the operating costs as low as possible.

"If everything goes well we can start mass production of buoys about 1990," said Falnes. "But that is in the best case."

In Sweden the problem is somewhat different (Chalmers in Gothenburg is making certain experiments). The amount of energy in the waves along our coasts is only one-fifth as much as Norway's. It depends entirely on the wave height.

[See figure on following page]



When the waves pass the wave lens they change direction

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ENERGY

EXPERIMENT WILL FEED SOLAR HEAT INTO DISTRICT HEATING NET

Stockholm DAGENS NYHETER in Swedish 12 Nov 80 p

[Article by Mert Kubu: "Giant Experiment with Solar Heat"]

> [Text] Is it possible to feed solar heat into a heating net--at a reasonable price? This will be tested on a full scale for the first time in the world at the Sodertorn heating net south of Stockholm. The price will be 11 million.

Halvard Gedung, the project leader, hopes the installation will be in operation next summer. Among other things, very advanced Dutch "solar heating pipes" will be tested at Soderton.

The Swedish Society of Heating Works is behind the project. Gedung is the project head and conceiver. He will install 2,000 square meters of sun gatherers of various makes in an oak grove east of Hagelby Farm in Botkyrka.

About 10 types of sun gatherers will be tested. In December, the Construction Research Council will decide whether 11 million will be invested in the experiment. If the money is available, the project will be under way next fall, says Halvard Gedung.

"It must be a serious attempt," says Gedung. "If it is possible to use solar heat for heating nets at reasonable prices, construction of the first solar heating network can be begin in the fall of 1982. If it is not possible then we shall begin talking about something other than solar heat."

Highly Effective Solar Heating Pipe

His hope rests on a new type of solar heating pipe, designed by Dutch Philips and tested for almost 3 years in Eindhoven. They look like neon tubes, but are vacuum sun gatherers of glass containing a heating tube.

The refinement of the sun pipe is that it needs no water supply. There is no risk of freezing. It produces very high temperatures, in principle between +104 and +80 degrees. The pipe contains a coolant, isobutan, which is evaporated and stops the heating at the temperature of +134 degrees.

The heating pipe of the heating network is coupled to the heatproducing head of the sun catcher.

"Even on a cold day in February these sun catchers can give off a heat of about 80 degrees," says Rolf Martenson, Philip's energy expert in Sweden.

Two American and one Japanese company have manufactured somewhat similar solar heating pipe. But the Japanese one is supplied with water.

Higher Risk of Snow and Ice

"We believe that our sun pipe have a life span of 20 years, as compared to perhaps 10 years or less for traditional sun catchers, but we cannot prove it," says Martenson. The glass pipe is not broken by hail, but can be broken if, for example, someone throws stones at it. The sun catcher fields of a heating network must therefore be fenced in.

In the Netherlands and France the Dutch heating pipes are used with reflectors. In Sweden there is greater risk of snow and ice. Therefore 15 heating pipes will be installed per square meter of sun catcher surface--but without background. Sand on the ground will be a natural reflector. It suffices.

If by 1990 we have a chance to obtain the 3 TWH (terrawatt hours) of solar heat called for by the prognoses, the solar heat network must be successful without mishaps. Three TWH of solar heat require 9 million square meters of suncatchers of the new, highly effective type--considerable areas.

Much Money at Stake

Much money is at stake, for the manufacturers as well. If the experiment is successful, the enterprises are anticipating a big insutry.

There are many difficulties, however. There have been a multitude of more or less unsuccessful experiments with solar heat. Either they function badly technically--there have been many examples of this in Sweden--or they function, but solar heat becomes altogether too expensive.

"We may be able to produce solar heat at .20 to .25 krona per kwhr at 1980 prices by 1990," says Martenson.

But this requires that the technique functions and that solar heating pipes (heatpipes in English) be produced on a very large scale: 2 million square meters per year: Otherwise, the situation on the solar heat front is as follows.

There are a number of more or less complicated individual solar heating houses. These are small houses with water tanks, stone storage tanks [sic] and/or heat pumps. Some work, some do not. They are expensive, often so-called engineers' christmas trees.

Inglestad in Vaxjo Functions Poorly

Experiments are under way with the so-called chemical heatpump, but energy from this invention is still too expensive.

Solar heat for groups of houses: Two large projects, Ingelstad in Vaxjo have functioned poorly, and Lambohov in Linkoping has been in operation for only a short time. Two new projects are being planned, one in Uppsala and one in Sodertalje.

It is quite possible to store solar heat in large water tanks. The question is, however, whether it can be done at competitive prices. More experiments on a large scale are needed.

Ground storage of solar heat is also being tested, with very mixed and debatable results. Whether this method succeeds will probably depend upon local soil conditions.

Solar Heat fed to the heating network system: Sodertorn may become the first experiment in the world. Tests on a small scale were undertaken last winter in Skogas.

Rolf Martinsen: "Even if all experiments turn out well and there are no setbacks and time lost, we should reckon with solar heat furnishing at most 10 percent of all heat for housing and premises around the year 2000.

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NEW COMPANY TO PRODUCE COMBUSTIBLE COAL-WATER MIXTURE

Stockholm DAGENS NYHETER in Swedish 12 Nov 80 p 28

[Article by Olle Rosrander: "New Company for Coal-Water"]

[Text] Another group of Swedish companies is now considering a coal-water mixture as fuel instead of oil.

Nynas, Granges and Cementa will early next year make a decision on an experimental installation for production of "slurry."

The method is similar to the one in which Boliden and Carbogel, Inc. are investing between 20 and 30 million kronor in developing.

Coal is ground to a powder and mixed with water. The result can be used as fuel, in steam boilers, for example.

The development is taking place in cooperation with one of the many American companies that have adopted the method of keeping the coal-water mixture in suspension, so that the coal and the water do not separate.

Cementa's plant in Stora Vika near Nynashamn, built for lime mining and cement production, can be converted to this production, but the port is to small to accomodate large coal-carrying ships.

"We must bring the coal in in smaller vessels from a reloading harbor," says Sven Borelius, Cementa vice-president, "and the plan for a new large coal port in Nynashamn suits us very well."

Nynas has for some time been planning a transshipment port in Nynashamn for providing coal for all of central Sweden. Competition with Oxelosund, which also wants the coal port, is expected to be hard.

In 2 weeks, deliberations will begin in the water court on the application of Nynas for a permit to build a transshipment port on the east coast.

Cementa had earlier attempted to interest Skab in taking over the plant in Stora Vika to handle and burn waste dangerous to the environment.

"It would have resulted in increased employment," says Sven Borelius, "so from that point of view it would have been better, but it fell through because Sakab was not interested in our process. But if the experiment turns out well, this coal treatment can in time prove to be just as good."

The other great Swedish effort, which has gotten farther, is that of Boliden Carbogel, which already has an experimental plant in operation and is expected within a year to make a decision on how the necessary coal is to be brought to Sweden. The two Skane communities of Helsingborg and Landskrona are fighting to get the coal port, which will be one of the more important parts of Boldiden Carbogel's billion-kroner investment.

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BRIEFS

BILLIONS FOR CARBOGEL--Malmö (TT [Press Wire Service, Inc.])--Boliden AB is thinking of investing billions [of kronor] in the coal-based fuel Carbogel. Before the fuel is launched on the world market, Boliden and Carbogel AB will have to build a factory for producing on a large scale and develop harbors for importation of millions of tons of coal. According to the newspaper ARBETET, Boliden, which owns half of Carbogel, mentioned in an internal report four Swedish ports that are suitable for carbogel production. The paper does not say what ports, but does say that there is a good deal in favor of Landskrona and Helsingborg, where extensive experiments with carbogel are going on. Landskrona has been trying for a long time to become the site of a big coal port. But Per Brunke, newly appointed AB [general manager] of Carbogel AB, emphasizes from the employment point of view that the carbogel and separation installations will not be labor-intensive industries. Carbogel is almost pure coal in liquid form. It has the energy value of coal but lacks ash, sulfur, and metals, and is therefore better for the environment. The fuel was invented and developed by Olle Siwersson, of Helsingborg, who also started Carbogel AB. A year ago he sold half the company to Boliden for an unknown number of millions. Boliden's purchase of KF's [Swedish Cooperative Union] shares in Sydkraft was a step toward the goal of establishing Carbogel on the Scandinavian market. [Text] [Stockholm SVENSKA DAGBLADET in Swedish 10 Nov 80 p 26] 8815

WASTE HEAT FOR DISTRICT HEATING--This week Sweden's biggest project for saving fuel oil and using waste heat is being dedicated. The waste heat is conducted under the Göta river in Göteborg from one of the refineries to the central remote heating network. In this way Göteborg will save 50 million kronor in reduced fuel oil import requirements. The sulfur emission in the pollution-sensitive west coast area will be reduced by 450 tons. Making use of waste heat in this way will reduce the oil requirement by 55,000 m^3 a year. Via a 3,5 km tunnel under the mouth of the Göta, the Shell refinery will supply Göteborg with 20 percent of the city's total energy requirements, or 35 percent of the heat supply on the central network. For the project to be carried out, the refinery's cooling system had to be converted from air cooling to heat exchange with the city's remote heating network. The investment costs are 150 million kronor, with the Energy Board putting up the biggest part. The state contribution is 47 million kronor, and Shell is contributing 38 million kronor. Only a small part of the energy used in the industry is bound in the final products. The greater part is removed in cooling air and cooling water. The Göteborg project shows how the waste heat can be utilized efficiently. The project will probably be profitable after 2 years. In Göteborg 77 megawatts is being taken out, which corresponds to 535 GWh [gigawatt hours] a year in energy made usable. There are several similar projects under way in Sweden. Waste heat from Bolidenkemi is providing heat for half of Helsingborg, and ASSI [State Wood Industry] gives heat to Pitea.--Tommie Ekstrom [Text] [Stockholm NY TEKNIK in Swedish 16 Oct 80 p 3] 8815

ENERGY RESEARCH FUNDS REQUESTED--Stockholm, 16 Oct--Research on wind power, forest energy, and peat must be greatly increased. So claims NE, the Agency for Research on Energy Production, which is requesting 295 million kronor for next year for continued development of new energy sources. That is 25 million kronor more than DFE, the Delegation for Energy Research recently requested in its appropriation proposal for a 3-year research program. The increase is for forest energy and wind power programs. The DFE program still greatly exceeds the government's economy plan. [Text] [Stockholm NY TEKNIK in Swedish 16 Oct 80 p 9] 9287

CSO: 3102

SCIENCE POLICY

BUDGET CUTS IN RESEARCH MINISTRY DISCUSSED

Frankfurt/Main BLICK DURCH DIE WIRTSCHAFT in German 8 Nov 80 p 5

[Text] Frankfurt, 7 Nov -- Contrary to initial planning the budget expenditure of the Ministry for Research will be drastically reduced. At the same time, the ministry's entire research assistance policy will also be up for discussion. The following will give an overview of the task and function of the Ministry for Research and of its weaknesses.

The FRG Donors' Association for Promoting Arts and Sciences estimates the 1980 expenditure of private industry for research and development at DM 21 billion. This accounts for two-thirds of the FRG's research expenditure, which will increase to a total of DM 32.5 billion in 1980. At present, over 300,000 people work in research and development in the FRG, about 200,000 of those in industry. Approximately 10,000 employees in research and development are paid by DM 1 billion in research expenditure. Therefore cutbacks in research expenditure, as are currently being discussed, are of great significance to the research in the FRG. This will be particularly true when the cutbacks in the Ministry for Research are not counterbalanced by an increase in indirect research assistance of industry. In 1980, the FRG has made approximately DM 2.3 billion available for civil research and development conducted by industry -- DM 2.1 billion through the Ministry for Research. The Ministry of Defense provides additional funds for industry amounting to DM 1.2 billion. Besides this direct research assistance, assistance is provided through tax relief, which in recent years has been relegated to insignificance, because investment allowances for research and development only are paid now. The Ministry for Research is of crucial importance to large-scale engineering projects, in particular, as well as to certain sectors of industry, excluding the chemical industry, however.

The personnel allowance for research and development, often labeled as indirect research assistance, from which small and medium-sized enterprises benefit, is paid from budget funds as well. Enterprises have no legal claim to this personnel grant. Industry, represented by its associations, has always claimed that the personnel allowance should be legally sanctioned by the tax law so that a legal claim would ensue. Otherwise, there will always be a danger that the state will reduce personnel allowance funds on short notice and thus reduce its support of industrial research. The problems for industry will not be discussed here in detail.

The Federal Ministry for Research and Technology (BMFT) had originally provided for DM 6.17 billion in research expenditure in the government's 1980 budget proposal. In the meantime, however, the Bundestag and the minister for finance have implemented cutbacks. Details may be seen from the table below.

At present, the Ministry for Research still has DM 5.5 billion at its disposal for 1980. This amount might increase, if various freezes were lifted so that the Ministry for Research could expend a maximum of DM 5.86 billion for 1980. Thus, the Ministry for Research defrays approximately 75 percent of the FRG's research expenditure which, according to the present medium-term fiscal planning, should increase by an average of 7.1 percent annually by 1983. When this budget was submitted in late 1979, the Federal Government was still supporting an expansion of research assistance. This is to change now. When reductions in the research budget become necessary, the structure of expenditure should be taken into account according to the utilization of funds, because the Ministry for Research has many international obligations and must maintain a large number of research institutes and research centers. The 1980 appropriation of research expenditure, for instance, is as follows (given in percentage of total expenditure):

--Administration of ministry	0.7
--Research institutes and centers	33.8
--Project assistance	54.1
--International organizations and institutes and miscellaneous	11.3

During 1980, approximately DM 2.1 billion of the project assistance funds go to industry. The remainder is distributed among government institutions and various research facilities. The average term of research projects receiving project assistance is about 2.5, years so that in 1981 past liabilities have to be met by the minister for research. Even if the appropriation of new projects were stopped completely, about DM 1.1 billion of research funds at the most would be released for the 1980 research budget in relation to the government's proposed budget. Many critics of the research budget have been dismayed by the expansion of project assistance in recent years and the resulting buildup of the research bureaucracy. This can be summarized as follows:

--At present, approximately 7,000 assisted research projects, as compared to 2,079 in 1972. From 1972 to 1980, a sharp reduction of the amount of assistance per project and, thus, an increase in the share of administrative costs per project.

--A complex application system with continuous reporting requirements during the implementation of the research project. Approximately 750 project administrators under the authority of the Ministry for Research who, in view of the dwindling funds, only expand the research bureaucracy.

--A boundless system of consultants comprising about 1,400 consultants now, which has become a nuisance.

--A great number of research programs (currently 19) which overlap and are subdivided into smaller programs, requiring a rationalization of research assistance which is nonexistent. Over 300 advisory opinions and studies annually for DM 70 million in the Ministry for Research, which are hardly read by anyone.

--As the Federal Auditing Agency noted on several occasions, hardly any control over the research projects which have been settled.

--Assistance of a great number of research projects which would have been accomplished without state support, or assistance of projects which do not meet demands at all. When examining the research assistance of the Ministry of Research today, it is more difficult to name the projects not receiving assistance then those receiving assistance. This combination of research bureaucracy, lack of transparency in the entire research assistance area, and the intervention in the economic system which is no longer consistent with the social market economy system, has naturally led to constant criticism by the federal minister of economics and also by a large number of enterprises. Therefore the cutbacks in research expenditure of the Ministry for Research can well be justified, but in the interest of the entire economy, the lack of research expenditure should be offset by specific indirect research assistance through tax relief. A one-sided reduction of the research expenditure in the Ministry for Research will otherwise lead to a serious decline in some industrial enterprises.

In addition, a weeding out of the state research centers and research institutes, which has been long overdue, has not been undertaken due to political considerations. One concentrates on project assistance in industry, since it is believed that it is politically easier to effect cutbacks in this area. There is no talk of investigating all of the state research centers, in particular the large-scale research facilities. The muchtouted mobility of the researchers in the state research facilities is not warranted any more, because, as a rule, their income level is so high -- this applies to the staff in nuclear research facilities, in particular -- that the move to private industry is no longer profitable. This crucial problem of research funding by the Ministry for Research, however, is totally ignored by the present cutback measures. It is hard to say specifically where each DM will be saved, but the following principles should be taken into account when weeding out the research budget:

--Freeze on hiring and cancellation of established posts in all state research facilities supported by the Ministry for Research.

--Review of the tasks of all research facilities of the Minstry for Research.

--Concentration of project assistance on technologies which are of crucial importance to the national economy and which the private sector does not initiate to the extent required due to the longterm nature of the projects.

--Elimination of all remaining research assistance and redirection of the released funds to indirect research assistance by means of a personnel grant and investment grant through tax relief.

--Drastic reduction of the research bureaucracy through dissolution of all project sponsors and project assistants.

If this program were realized, the research budget could well tolerate a strong cutback. At the same time, a higher degree of efficiency of the utilized research funds would result by redirecting them to industry and avoiding overblown research bureaucracies. The Federal Government is planning a 1980 budget of DM 6.0 billion for the Ministry of Research. Compared to the medium-term fiscal planning, this represents a cutback by DM 700 million, yet it is still 4 percent more than the 1980 estimate.

Ministry for Research Budget
(in DM million)

Purpose	Government's Proposed Budget	1980 Bundestag Budget	Supplementary Budget 1980	Freezes and Expenditure Decrease 1980	Remainder 1980
1. General Administration	45,2	44,5	44,5	-	44,5
2. General Research Assistance	546,2	543,8	536,4	5,2	531,2
3. Research in Natural Sciences & Technology	1332,0	1320,9	1285,4	35,2	1250,2
4. Information Technologies	578,5	559,1	522,2	57,2	465,0
5. Energy Research	2253,5	2245,4	2200,8	148,9	2051,9
6. Research of Space, Transportation and the Sea	1391,0	1379,7	1359,0	117,0	1242,0
7. Various Research Institutes (3011/12/13)	28,7	29,0	29,0	-	29,0
8. Overall reduction		-121,1	-121,2	-80,7	-80,7
Total	6175,1	6001,2	5856,1	444,2	5533,1
Compared to 1979	5568,2				
Growth 1980/79 in percent	10,9	7,8	5,2		-0,6

9544
CSO: 3102

TRANSPORTATION

MAJOR EUROPEAN AUTO MAKERS ATTACK FUEL-CONSUMPTION PROBLEM

Paris INDUSTRIES & TECHNIQUES in French 10 Oct 80 pp 20-23, 25, 27-28

[Article by Jean-Louis Toumit: "The Automobile in Time of Shortage"]

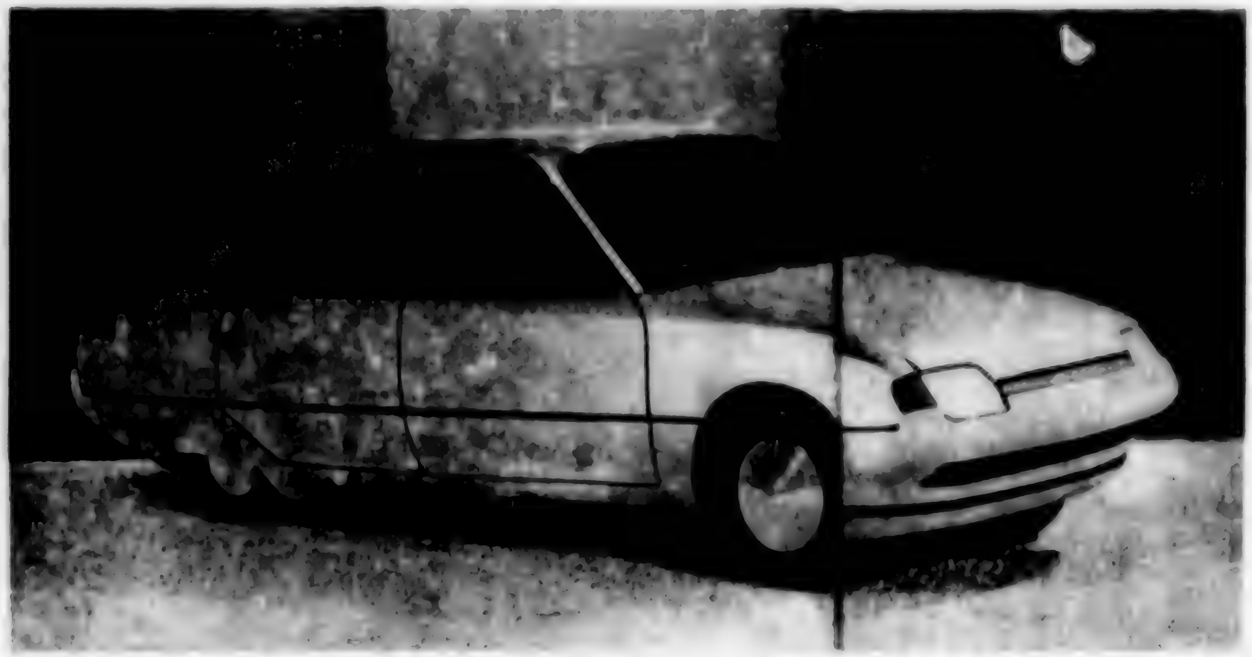
> [Text] Centiliter after centiliter, percentage after percentage, automobile manufacturers are groping in all directions to reduce the fuel consumption of their models. The special exposition on energy saving being held at the 67th Automobile Show is providing an opportunity to evaluate the projects and probe...the tanks.

After an era of waste, now is the time to save energy. This applies to the automobile more than to anything else, and manufacturers have their sights focused on the consumption curves of their models.

To obtain cars which operate more economically, they are able to work with several parameters: aerodynamics, weight, motor, transmission or tires. Actually, a combination of all these elements gives the best result. But this is also a difficult task. Renault and Peugeot are attempting to accomplish this with their experimental vehicles: Eve and Vera. Fiat seems to be taking the same position: its Ritmo is an initial step. Volkswagen is concentrating more on changes and improvement in the motor, for, all things considered, the German company has come to the conclusion that making a lighter vehicle can be very expensive.

Moreover, weight reduction poses technical problems in the substitution of one material for another (shock resistance, excessive use of the new material to retain the same qualities and the like). Weight reduction is also hindered by economic factors: high production costs for extremely light materials--titanium, for example--which are often considered rare and in the strategic category. Excessive use of energy involved in coming up with new materials may, in the long run, offset any saving achieved in making the vehicle lighter. Sizable investments are also required for mass production. And it is necessary to retain existing production tooling.

Manufacturers must therefore zigzag among these various obstacles before proposing vehicles which guzzle less fuel. This type of saving is naturally a valid sales argument, particularly at a time of decreased demand. It remains to be seen how much additional cost the buyer will be willing to pay to use less fuel.



Renault Eve and Peugeot Vera: current know-how on energy saving in mass-produced cars is yielding an average fuel reduction of 25 percent.

The Golf. With the new "E" transmission, peak speed is reached with the next-to-last gear; the highest gear ratio serves only to produce less wear on the motor and a 10 to 13 percent saving in fuel consumption.

The new Fiat Panda is the prototype of a practical and economic car: it consumes only 5.1 liters per 100 km at 90 km per hour.

You will be able to see Eve and Vera at the 67th Automobile Show. They are not prestigious "racetrack women" but rather experimental vehicles being presented by Renault and Peugeot. Their specialty is not being very greedy in fuel consumption. The first uses 4.5 liters per 100 km at 90 km per hour, 6 liters at 120 km per hour and 8 liters in city traffic. The second uses a little more on the road and a little less in the city. Overall, there is a 25 percent decrease in fuel consumption for each vehicle.

To arrive at these results, the manufacturers--in agreement with the Energy Saving Agency /AEE/ which financed part of the engineering (13 million francs)--did not seek innovation at any cost. They applied all available know-how to work out solutions on mass-produced cars: Eve (Elements for an Economic Vehicle) developed from the R 18, and Vera (Economic Vehicle of Applied Research) from the 305.

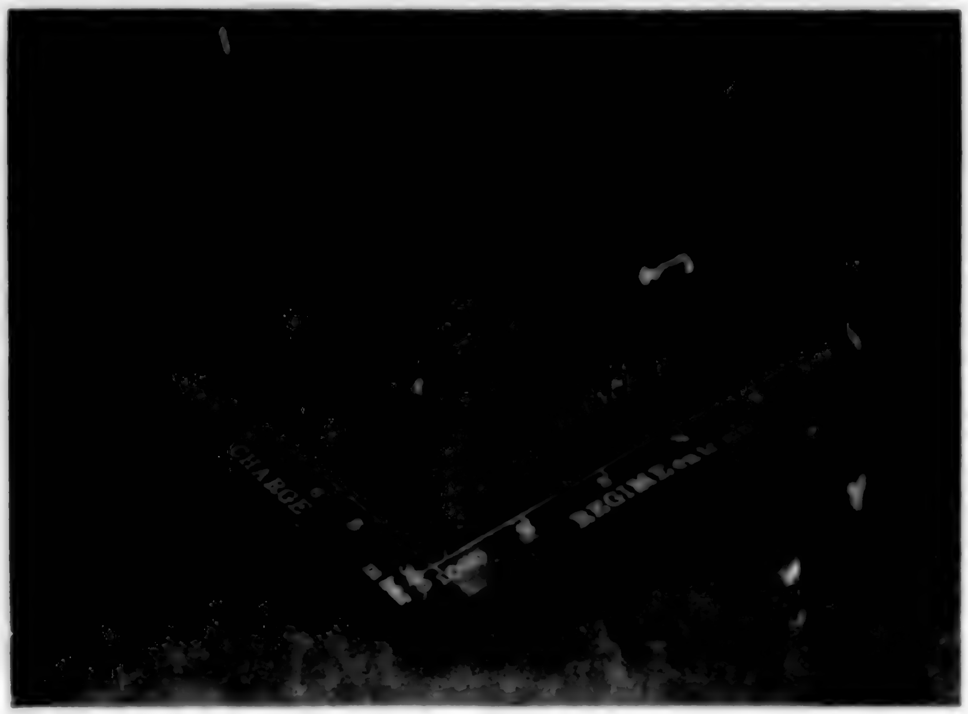


Diagram of "motor surface" obtained through numerical analysis of variations in motor load (depression) and normal operation for an ideal yield. Placed in a memory bank and consulted by a computer which is part of the ignition system (charted ignition), they serve to reproduce the best power-consumption ratio in actual driving.

Improving the Aerodynamics

Resistance to movement is dependent upon the vehicle's mass and aerodynamic resistance, which is proportional to SCx (vehicle's projection surface per coefficient of penetration in atmosphere). It is these two parameters which influence fuel consumption. The first is more important at low speeds, while aerodynamics takes precedence at high speeds. That is why all solutions adopted are directed toward improving the aerodynamics, reducing the weight and perfecting the motor and transmission.

With regard to weight reduction, aluminum alloys (crankcase, gearbox) and plastics (ABS, polycarbonates, PVC) for interior equipment and nonwearing parts (hood, doors, tanks) are widely used throughout the two vehicles.

Fuel-consumption test stand. The new DIN 70 030 regulation is henceforth to serve as a means for controlling fuel consumption. Its various elements (city driving; 90 km per hour; 120 km per hour) are regrouped in a balanced value in a ratio of one-third each.

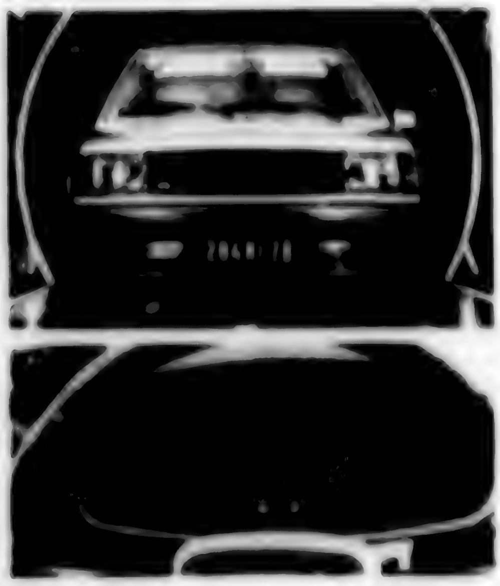
750,000 "Economic" Vehicles

The AEE has signed contracts with French manufacturers who, within the next 12 months, will be equipping 750,000 automobiles with fuel-saving accessories (spoilers, deflectors, driving aids).

In this manner, the 300,000 Renaults, 200,000 Peugeots, 200,000 Citroens and 50,000 Talbots--all "economic" vehicles--will save 75 million liters of fuel per year.

HSLA steels with a high degree of elasticity have been chosen for auto frames and bodies. Thinner windows (3 mm instead of 4 mm) and a new tire configuration are also helping to reduce resistance to movement. Lastly, there has been a substantial achievement in weight reduction--greater than 10 percent: actually, 160 kg for the Vera in comparison with the 305 GR.

Efforts to lower the Cx have resulted in a number of tests in a wind tunnel in Saint-Cyr. Streamlining the underpart of the vehicle (the shape of the bottom of the body) and improving the airtightness in the front and the flow of air in the motor compartment (the passage of the front wheels) as well as adding spoilers and deflectors have all substantially reduced the coefficient of drag. Between the 305 and the Vera it has gone from 0.45 to 0.32. It has reached 0.26 for the Renault Eve (0.39 for the R 18), an excellent performance worthy of a good racing car.



Not insignificant savings! The R 18 spoiler reduces the Cx by 3.1 percent and fuel consumption by 2.3 percent at a constant speed of 120 km per hour.

A deflector placed on a GS improves the Cx by 8.2 percent. On the Peugeot the "econometer" (under the steering wheel) and the "econoscope" (under the speedometer) furnish the driver all necessary information for normal driving.

The third group of solutions adopted involves the motor and transmission. For the motor, Peugeot has retained a supercharged diesel or a gas model with charged ignition which adjusts the ignition advance for each of the motor's running positions. Renault has chosen an integral electronic ignition on one of its regular line of motors, which might be that of the R5 GTL. With regard to the transmission, 5-speed gearboxes have naturally been selected with Renault proposing minicomputerized automatic control.

With Eve and Vera, Billancourt and Sochaux have shown that it is possible to reduce fuel consumption by 25 percent while maintaining the performance of mass-produced models (140-150 km per hour). A new step has therefore been taken. But what will be the side effects for the average person? They will depend on the cost of modifying the production equipment (manufacturers and subcontractors) in accordance with the solutions finally adopted. Renault and Peugeot still have a long way to go to "democratize" their energy experimentation.

Fiat and the other Italian manufacturers have pledged to reduce fuel consumption by 10 percent before 1985. This will be a difficult task, for Italian automobiles are not "gas guzzlers." However, it is an essential task, for the struggle against excessive fuel consumption has become a vital question for Fiat as for all others.

Considerable progress has been made in the area of weight reduction. There is a difference of 14 kg between the steel sheet of the 305 and the SMC (sheet molding compound) used for the doors of the Vera. But despite the advantages--reduction in the number of pieces and absence of rejects during manufacture--the energy tally of plastic is still largely inadequate.

In recent years, 40 prototypes, nearly all derived from mass-produced cars, have made it possible to improve the fuel consumption of the various models. Research has centered on motors and transmissions. Results: the diesel Ritmo uses only 5.5 liters per 100 km at 140 km per hour and the new Panda uses only 5.1 liters at 90 km per hour. For Fiat also, future development work on motors will be connected with electronics. With totally static electronic ignition, electronic injection and gearbox with electronically controlled constant gear reduction, the Turin firm hopes to achieve fuel savings of 20 to 25 percent.

Special plastics are gaining ground: the entire front of the Ritmo has been designed for the use of reinforced polypropylene.

With regard to weight reduction, new materials at Fiat as elsewhere are encountering technical roadblocks (mechanical properties) and economic problems (acceptable surcharges). However, that is not preventing some of them from gaining ground. This is the case with special plastics. Thus, the Ritmo's front part and bumper consist of a single subassembly made of reinforced polypropylene. This is also the case with aluminum. Aluminum is now used in the Ritmo for the door panels and fuel tank. Other materials--more costly--are still being used only for specific pieces. The gear shaft of the Fiat 131 Rallye is made of carbon fiber; it weighs 70 percent less than the conventional shaft.

Fiat is anticipating an overall decrease of 15 percent in the weight of its cars in the years to come. The Lancia Delta seems to be on the right track: replacing the Fulvia, it weighs 70 kg less, uses 15 percent less fuel and is 10 percent faster.

Volkswagen: Priority Given to Motor and Transmission

"The simplest way to save a lot of fuel would be to change the motor's horsepower, the weight and the value of the SCx in harmonious proportions. Cost

Thanks to light materials, Fiat will reduce the weight of its cars by 15 percent in the next few years.

factors are preventing automobile manufacturers from going ahead with the necessary weight reduction measures." This is how Wolfgang Lincke, head of Volkswagen's department for the development of private cars, expresses the German company's strategy in the area of energy saving. Moreover, without considering the cost, W. Lincke shows with figures that the influence of aerodynamics is, on the average, greater than that of weight. Thus, from tests made in accordance with the new DIN 70 030 regulation and calculating fuel consumption during deceleration and slowdown, we note that aerodynamics is responsible for 50 percent of the consumption compared with 42.5 percent for weight in the case of a combustion engine. These percentages are respectively 53 and 42 in the case of a diesel motor.

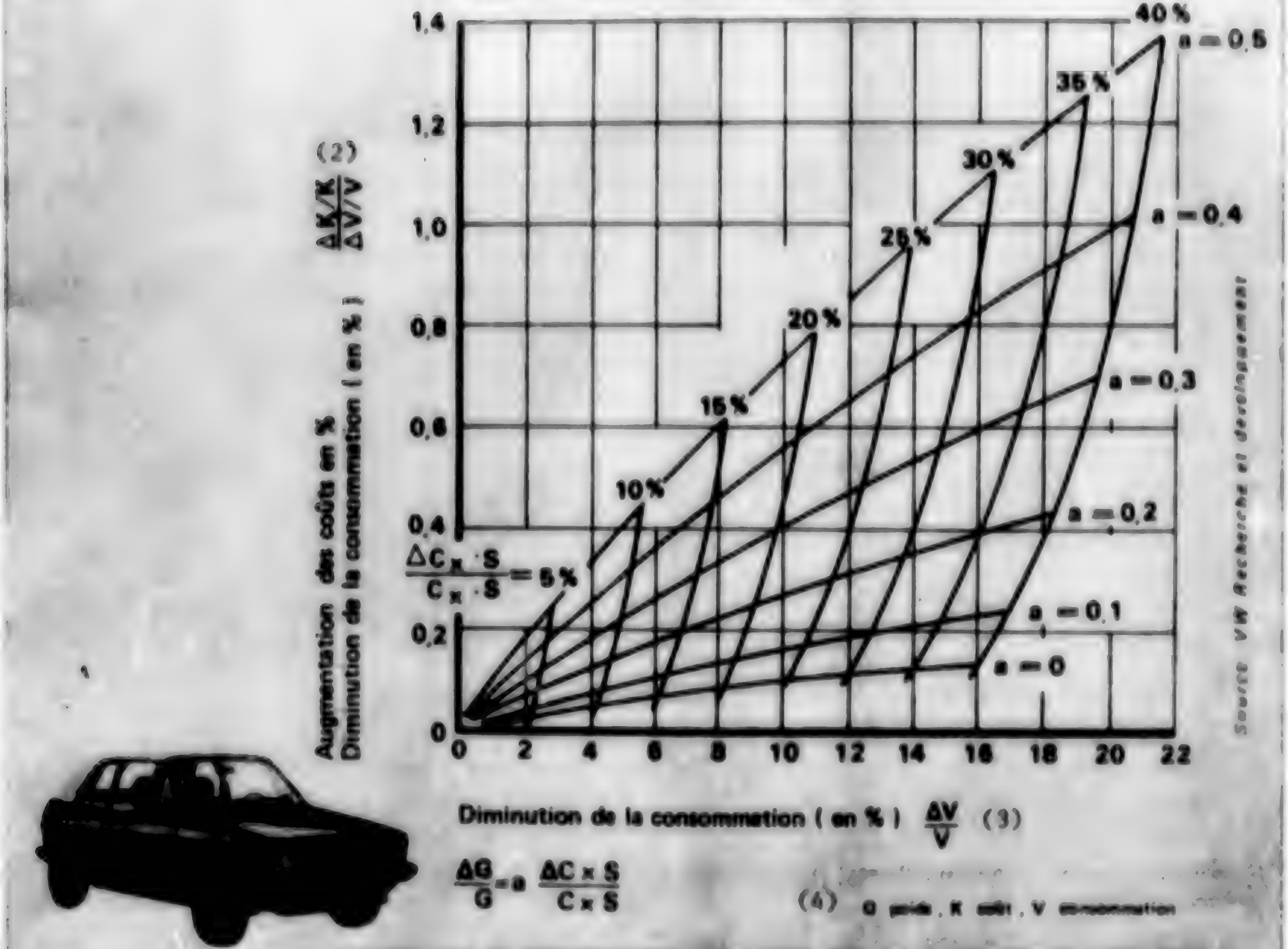
In Volkswagen's opinion, aerodynamics is therefore one of the parameters which merits priority attention. This is provided motorization and transmission "follow" movement. For improvement of penetration in the atmosphere or of several kilograms of weight will be of little consequence if the motor and transmission are not adapted accordingly. With a weight reduction of 1.0 percent, the saving in fuel consumption will be 0.1 percent if the transmission is not modified and 0.3 percent if it is modified.

With regard to the motor, electronics will be of great help to the driver in telling him when to shift to the next gear or doing it for him. For at a given horsepower, fuel consumption is lowest only at a well-determined operating level. Savings up to 16 percent are possible at that level.

At present there is no alternative to the motor with vertically displaced pistons (the above shows a 1.6 liter Golf motor). But improvements are possible: reduced friction, increased compression ratios, multiple-jet combustion, supercharging by turbocompression. The other area of research pursued by Volkswagen consists of equipping the motors with regulating systems (Stop, Start, Freewheeling, Sparmeister /Throttle Valve/).

One solution for saving fuel is to optimize the combustion chamber (decreasing engine ping) by achieving higher compression. This requires changing existing production facilities to obtain closer tolerances. "But," Peter Hofbauer, head of the department for the development of mechanical assemblies, points out, "we expect a saving of 8 percent by increasing the compression ratio 2 to 3 units."

(1) AUGMENTATION DES COUTS POUR UNE BAISSE DE CONSOMMATION PAR DES MESURES AERODYNAMIQUES ET DES DIMININUTIONS DE POIDS



Source: VW Recherche et développement

(5) *L'amélioration de l'aérodynamique coûte moins cher que la réduction de poids. Ainsi, pour diminuer la consommation de 8 %, il faut améliorer l'aérodynamique de 20 %, ce qui entraîne un surcoût de 0,8 %. A surcoût égal, on ne peut réduire le poids que de 10 % seulement.*

Key:

1. Increased cost for a reduction in fuel consumption through aerodynamic measures and weight reduction.
2. Increased cost (by percentage) / Reduced fuel consumption (by percentage) $\frac{\Delta K/K}{\Delta V/V}$
3. Reduced fuel consumption (by percentage) $\frac{\Delta V}{V}$
4. G = weight, K = cost, V = consumption
5. Improvement in the aerodynamics costs less than weight reduction. Thus, to decrease fuel consumption by 8 percent, the aerodynamics must be improved by 20 percent, and this involves a surcharge of 0.8 percent. For the same surcharge, weight can be reduced by only 10 percent.

20 Percent Saving With Motor Tune-up

Fuel injection, electronic ignition and driving the electric fan by thermostatic control (standard equipment on Volkswagens) give some additional percentages as does the use of "superlubricating" oils. Meanwhile, reduced motor friction, even if limited, would lead to a 5 percent reduction in fuel consumption.

In the case of diesel motors, Volkswagen hopes to introduce direct injection before 1990. The combustion system which uses multiple jets discharged into the air would provide for a 10 percent fuel saving over the diesel motor which uses a turbulence chamber.

Supercharging by turbocompression also offers a noteworthy means for reducing fuel consumption (a 10 percent reduction with a diesel motor while retaining the performance of a combustion engine with the same cubic capacity).

The transmission must also be modified to keep pace with a closer gear-ratio arrangement. But such an arrangement reduces the surge of power available in the highest ratio. "To eliminate this inconvenience," Peter Hofbauer asserts, "we must be much more precise in calculating the gear reduction of the highest gear ratio. This operation is possible with a 4-speed transmission by modifying the other gear ratios to reduce losses." Fuel savings are substantial, coming to about 10 percent in the case of the Golf (using the DIN test).

Tuning up the motor, that is, its cyclic gear engagement and disengagement so as to use only the average horsepower required is another area being developed by Volkswagen. "These systems are not very well known and most are not yet ready for mass production," Ulrich Seiffert, head of the research department, points out. The Stop-Start procedure will surely be one of the first innovations to be incorporated in the new models. With the manual version, the driver can switch off the motor when his vehicle is stopped. With the automatic version, he can do so as soon as the speed is disengaged. Another system is that of freewheeling which uses the automobile's kinetic energy. With this system the driver can stop accelerating long before he reaches an obstacle. As for the assistance of the throttle valve (Sparmeister), which suppresses the rigid connection between the accelerator and the throttle valve in unfavorable operating areas, it obliges the driver to go to a higher gear. He cannot move too slowly with light acceleration.

All these regulatory systems, which provide for substantial savings (15 to 20 percent), involve considerable technical effort. But in the current analysis, the variation in the price of fuels will justify their installation on the vehicles of the future.

8568
CSO: 3102

TRANSPORTATION

FOKKER F29: DESCRIPTION, CURRENT STATUS OF PROGRAM

Gelsenkirchen AEROKURIER in German Oct 80 pp 1210, 1212

> [Text] On the occasion of the Farnborough Air Show the Dutch aerospace concern was able to release more details about the current status of the F29 program. Fokker is now fairly certain that the F29 will not be a "paper project" for much longer. It is hoped that the F29 design can be finally frozen before the end of this year. From what was originally a relatively conventional concept Fokker has developed the F29 into an airliner project with the most advanced technology. About 6,000 hours in wind tunnel tests and computer time have been invested so far in the development of this new twin-engined airliner from Fokker. By mid-1981 total investment in the F29 project will reach about $75 million.
>
> At the moment Fokker is in the advanced stages of dialogues with interested airline companies all over the world; efforts are being made to integrate as far as possible customers' wishes into the design before it is finalized. Already Fokker is able to give future customers firm guarantees on the performance and economy of the new airliner.

If until now Fokker had its sights set principally on Third World airlines and the regional airlines of the industrialized countries with its F27 and F28 models, the Dutch concern now wants to achieve a break in with the so-called "flag carriers," that is, the national airline companies. Their jet which has been optimized specially for short-range use is to take off on its maiden flight as early as 1983. The first deliveries to the airlines are planned beginning in 1985. These planned deadlines assume, however, that the F29 program will start officially before the middle of 1981, otherwise prompt manufacture of production facilities, tools and parts with an unusually long delivery time cannot be assured.

Fokker is currently setting up two conditions as a presupposition for the start of the program, which must be met beforehand:

--a cooperative agreement must be signed with one or several other manufacturers, since Fokker is unwilling to start the F29 project alone. Negotiations with manufacturers in the United States, Japan and Europe are being held on this topic.

--the second presupposition is a sufficiently large order from a well-known company, which is willing to assume the function of the "launching customer." Judging by the opinions expressed thus far by the companies approached by Fokker, the concern is confident that it can meet both the conditions that it set for itself by mid-1981, so that nothing else will stand in the way of an official start to the program.

Economical Consumption

In analyzing new aircraft projects, everything today is intensively concerned with fuel consumption. Fuel costs are the dominant single factor in operating costs. In addition, no one can say today how fuel prices will shift by the end of the decade. So at Fokker the F29 project was again combed through for every opportunity to save fuel. The possibility emerged of reducing energy consumption by a good 5 percent by modifying the wing design.

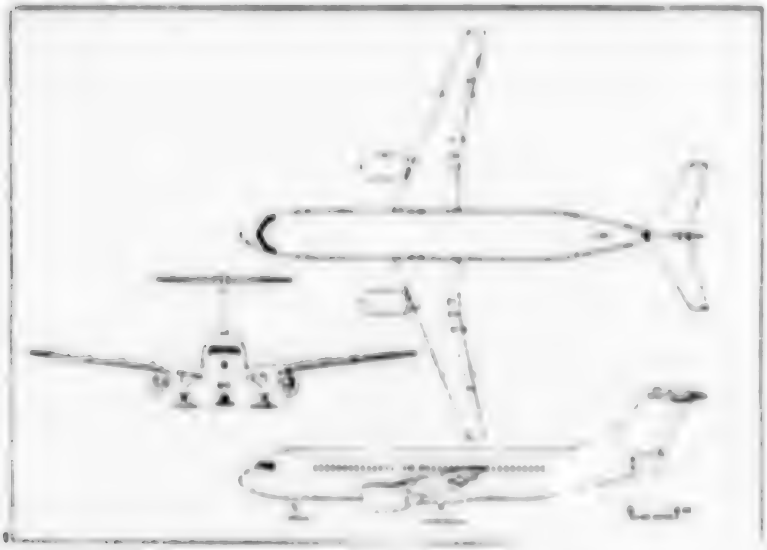
It became possible by increasing the lift of the wing without altering the basic design parameter of the wing or reducing wing thickness or the sweep back of the wing. It then became possible to reduce wing size by 6 percent without reducing total wing lift in flight. Besides reducing drag, this also made possible a reduction in total weight, which in turn allowed an additional row of six seats. These two factors, reduction of wing drag and increasing the maximum number of passengers, together result in an improvement of specific fuel consumption per seat mile flown of about 5 percent. It must also be taken into consideration that the F29 design with the "old wing" promised a fuel saving of 7 to 10 percent compared with previous passenger aircraft in this class. If one considers an additional fuel saving on the order of 17 to 19 percent on the engine side, there is a total saving on the order of 35 percent in fuel consumed per passenger mile flown.

156 Seats Maximum

In the standard version the F29 will be able to carry 138 or 156 passengers, depending on the seating arrangement. In line with the current airline trend of transporting airfreight in the below-floor cargo areas of the planes used in passenger service, the F29 will have a fuselage cross-section that enables it to carry containers of the B727/B707/DC-8 class in its cargo hold.

[Illustration on following page]

Die Fokker F29 hat endgultig Gestalt angenommen. Unser Riß zeigt den Entwurf im derzeitigen Stand



The Fokker F29 has finally taken shape. Our drawing shows the design in its current state.

In any modern airliner design today later growth is planned into the intial design. The F29 was laid out to permit progressive enlargement without fundamental or far-reaching changes. Later, stretched versions will most likely have seating capacities of 162 to 179.

A stretched version of the F29 could--assuming there is corresponding demand--be vailable about 3 years after the standard model. With a maximum number of passengers the F29 is to be capable of flying routes of 2,700 to 3,100 km. Long-range versions now in the planning stage are said to be capable of covering routes up to 4,550 km in length with 138 passengers.

Great Demand Expected

Fokker is extremely confident about demand for the F29. The Dutch company is calculating that the national airline companies will again concentrate more on the short- and medium-range traffic, after competition on the long-distance international routes becomes more and more ruinous. On the basis of these assumptions, the F29--according to Fokker--offers the airlines the opportunity of operating cost-effectively and profitably in their traditional area of operation.

Besides the excellent fuel consumption, increased demands for environmental protection are in favor of aircraft using new technology. If one takes as a base the number of first generation jets that will have to be replaced in the mid 1980's and if one considers the current growth potential in air traffic, the result--according to Fokker--is a potential market of 15,000 new airplanes in this class.

Engines

Fokker is offering the F29 with two engines, the

--General Electric/Snecma CFM56-3 as well as the

--Rolls-Royce/Japanese Aero Engines RJ500-01 which is now in the planning stage.

Both engines are in the 20,000 lbs category (9,072 kp, 90kN). According to the engine manufacturers figures, a reduction in consumption of between 17 and 19 percent can be expected. One thing making this possible is the high bypass ratio of about 5:1 of the new turbofan engines. At the same time noise emissions drop compared with current aircraft of this size. Fokker and the engine manufacturers estimate that the 85 dB noise line of the F29 on takeoff includes only 20 percent of the area that the same noise line of a conventional jet covers. So the 85 dB noise limit of the F29 lies within the perimeter of a normal airport.

Wing

The F29's wing is based on the theory of the new, supercritical profiles, which are known to be superior in flight by virtue of an extremely low coefficient of drag. A further advantage of these profiles is their relatively great thickness which makes light wing construction weight possible. Additional weight savings results from the fact that wings with supercritical profiles do not have to be swept back as sharply as conventional wings designed for the same speed range. The wings on the F29 have a sweepback of only 21°. More than 6 years work have gone into the design of the F29's wing at Fokker and at the Dutch National Aerospace Laboratory.

Construction

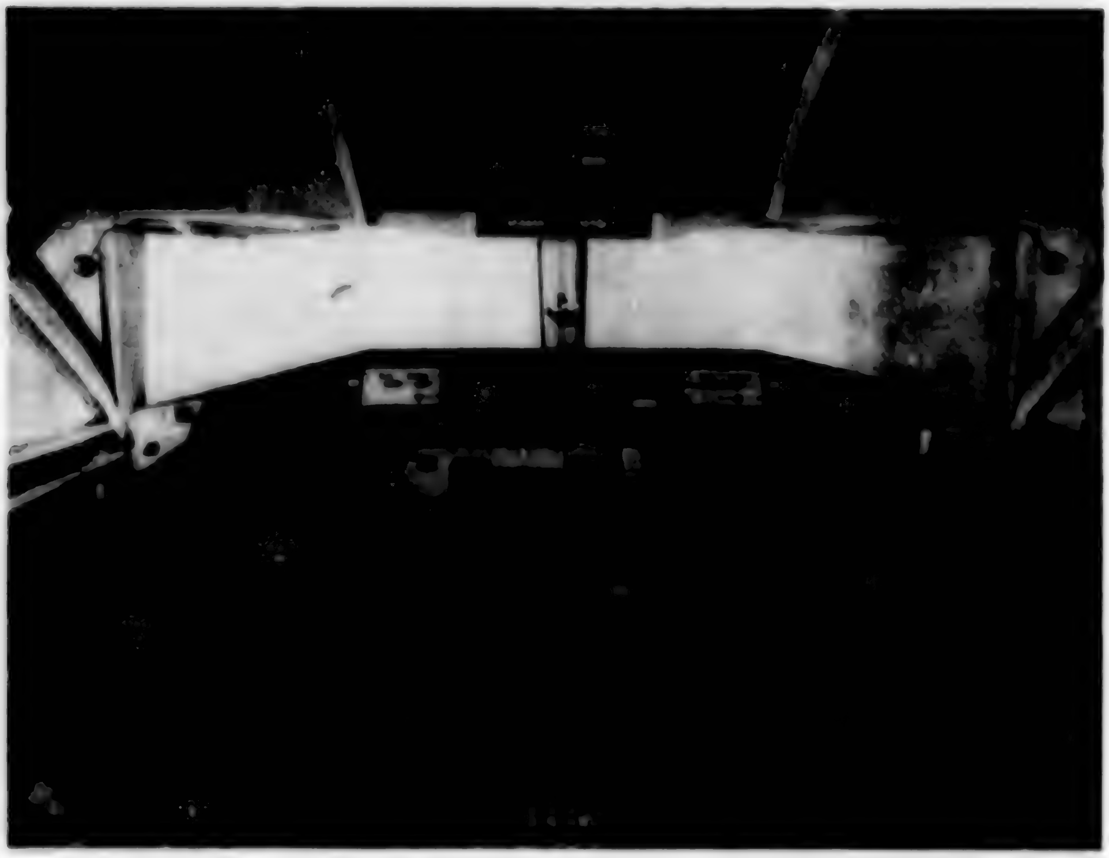
Composite materials are used extensively in the F29, for example, fiberglass and carbon reinforced materials for smaller and medium-sized components as well as for those exposed to high loads. Individually the engine pods, almost all flaps, spoilers, tailplane, elevators and ailerons, airbrakes, the material between wing and fuselage, landing gear flaps and the cabin components are executed in these modern materials. About 500 kg can be saved in structural weight alone.

Digital Cockpit

The cockpits in the new generation of airliners are designed from the start for the latest digital technology. Their appearances is completely new, one might almost say "empty" and very uncluttered in its effect.

In conjunction with the leading avionics manufacturers Fokker is working on a flight management system which combines and optimizes flight management, navigation and control in a central system. The flight management system will be able to fly the most effective flight path, either for the best fuel consumption or the shortest time, while weighing all the decisive factors. An advanced warning system to monitor malfunctions is divided into three operational stages: warning, caution and advisory. The crew receives all necessary information and procedures on screens to correct the malfunction.

[Photo on following page]



A mockup of the digital cockpit of the F29. Large frontal glass area and an almost empty instrument panel are characteristic of this airliner.

Fokker F29 Data Table

Manufacturer		Fokker, The Netherlands
Model		F29
Engines		General Electric/Snecma CFM56-3 or Rolls-Royce/Japan Aero Engines RJ500-01
Output	lbs	2 X 20,000 = 40,000
	kN	2 X 90 = 1980
	kp	2 X 9,070 = 18,140
Crew and Passengers		2 + 3 + 138-156

Overall Dimensions:

Length	m	39.3
Height	m	11.14
Wing Spread	m	32.88
Surface Area	m^2	108.0
Aspect Ratio		10
Sweepback		21°

Fuselage Dimensions:

Length	m	35.84
Height	m	4.01
Width	m	3.76

Cabin:

Length	m	25.84
Height	m	2.10
Width	m	3.56

Cargo Space:

Volume	m^2	36.7
Weight empty		
with RJ500-01	kg	33,720
with CFM56-3	kg	34,000
Maximum fuel weight	kg	18,600
Maximum payload with the CFM56-3	kg	16,800
Maximum takeoff weight	kg	59,770
Maximum landing weight	kg	55,300
Economical speed	Mach	0.75
Maximum speed	Mach	0.79
Ceiling	ft	37,000
	ms	11,285
Takeoff run according to FAR [Flight Aptitude Rating] at max. takeoff weight ISA [International Standard Atmosphere] + 15° C	ft	7,000
	ms	2,135
Approach speed at max. landing weight (1.3 Vs)	kts	120
	km/hr	222
Landing distance according to FAR, wet	ft	4,000
	ms	1,220

9581
CSO: 3102

LARGE-SCALE TEST OF ELECTRIC VEHICLES IN BERLIN

Frankfurt/Main ELEKTRIZITAETSWIRTSHAFT in German 15 Sep 80 pp 714-715

[Text] Simultaneously with the opening of the exhibition "Autos, Avus, Attractions" a large-scale test with about 70 electric vehicles began in Berlin. This test is part of the project sponsored by the Ministry for Research and Technology "Alternative Energies for Vehicular Traffic."

The electric vehicles used in the test--transporters, city buses and passenger cars--are being operated by firms and agencies located in Berlin.

The vehicles have a range of 60 to 70 km on a single battery charge. Charging of the batteries in most of the vehicles can be carried out by means of a built-in charger at any wall socket with a 16 amp fuse.

This large-scale test is intended to prove that electric-powered vehicles can be used successfully in everyday use in traffic and that they can be a genuine alternative to vehicles with internal combustion or diesel engines.

In this large-scale test questions concerning

--energy consumption

--conservation of oil

--driving characteristics

--behavior of batteries and propulsion units

will be answered from a practical standpoint.

It is hoped that the test will further prove that problems regarding the supply infrastructure can be solved. All the results from investigations by test participants, vehicle manufacturers, service facilities and test beds will be collected, analyzed and evaluated in order to obtain accurate documentation for making judgements and decisions.

For the duration of the test, which is to run for about 2 years, Bewag [Berlin Electric Power Works Corporation] is granting a special agreement to supply the vehicles with electrical energy.

Discussions are currently in progress in the working committee of the VDEW [Association of German Electrical Engineers] "Contracts and Tariffs" about electricity price rates to supply electrical vehicles with energy.

9581
CSO: 3102

TRANSPORTATION

BRIEFS

WORLD LOCOMOTIVE SPEED RECORD--An electric locomotive has set a world record of 231 km/hour on the 50 km stretch between Celle and Uelzen. In this locomotive braking energy is not lost as frictional heat but is fed back into the grid through the overhead wire. On short-distance runs, for example, up to 25 percent of the energy can be reclaimed. [Text] [Wuerzburg ELEKTRO TECHNIK in German 15 Sep 80 p 4] 9581

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7 Jan 1981

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